United States
Office of Personnel Management

FWS Job Grading Standard
for
Toolmaker

3416

Workforce Compensation & Performance Service
Office of Classification Programs
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WORK COVERED

This standard covers nonsupervisory work involved in the fabrication, manufacture, calibration, reconditioning, and repair of machine tools, jigs, fixtures, dies, punches, and gages used in the manufacture, overhaul, and repair of equipment.

WORK NOT COVERED

The following kinds of work are not covered by this standard:

-- Manufacturing, repairing, and maintaining dies used for drop forgings or press operations;

-- Grinding and sharpening cutting tools or grinding cutting tools to produce special shapes or to change cutting characteristics;

-- Making metal patterns for castings; and

-- Maintaining and making minor repairs and adjustments to precision measuring instruments and tools in a toolcrib or toolroom.

TITLES

Jobs graded by this standard are to be titled *Toolmaker*.

GRADE LEVELS

This standard does not describe all possible grade levels at which jobs may be established. If jobs differ substantially from the skill, knowledge, and other requirements described by this standard, they may warrant grading either above or below these levels.

3416-11 Toolmaker, Grade 11 3416-11

General: The WG-11 Toolmaker fabricates, overhauls, and repairs standard types of cutting tools such as drills, reamers, milling cutters, and carbide tools; jigs and fixtures; drilling templates; punching, forming, and blanking dies; and gages such as plug, ring, snap, and caliper gages. He performs duties in accordance with general instructions from his supervisor which normally include detailed blueprints or drawings, and specifications as to the material to be used and design of the end item.

Skill and Knowledge: The WG-11 Toolmaker must apply a comprehensive knowledge of and be skilled in using a variety of machine shop practices and techniques.

Workers at this level must be skilled in planning and laying out work from blueprints, sketches, or other work specifications; applying advanced shop mathematics and handbook formulas to compute dimensions and plan and layout work; setting up and operating all conventional machine tools and attachments; selecting proper tools and machine operations to be used; and performing necessary handwork such as filing, scraping, grinding, and lapping to finish and assemble items.

He must have a knowledge of standard cutting tools such as drills, reamers, taps, different kinds of milling cutters, form tools, and various carbide tools; the proper clearance and relief angles required on such tools based on the material to be machined; and the type of grit and bond, and size of grinding wheels needed to form and sharpen such tools.

The WG-11 Toolmaker must have a knowledge of the construction of standard types of jigs and fixtures and their uses in the machine shop. He must be sufficiently familiar with punches and dies and their principles of operation to enable him to fabricate and assemble such types as are used for straight punching, forming, and blanking operations. He must have sufficient knowledge of commonly used plug, ring, snap, and caliper gages and their critical dimensions to enable him to fabricate these less complex types of gages to close tolerances.

The WG-11 Toolmaker must be familiar with and capable of using numerous types of measuring devices such as vernier calipers, height gages, squares, protractors, inside, outside, and depth micrometers, surface gages, vee blocks, parallels, space blocks, dial indicators, and optical and mechanical comparators to attain accurate dimensions and close tolerances.

He must be familiar with hardening and annealing processes and their effect on the machinability of metals, and the dimensional allowances necessary to accommodate these processes.

Responsibility: The WG-11 Toolmaker receives work assignments from a supervisor in the form of blueprints, sketches, or drawings, and specifications or oral instructions which provide information on materials and tool design principles to be incorporated in the item to be made. He must determine and organize his work procedures and machining processes; note and provide for critical dimensions; and apply shop mathematics and handbook formulas to calculate dimensions

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such as those needed in determining center distances, angles, tapers, clearances, pitches, and leads.

The WG-11 Toolmaker works with and obtains guidance from a higher level journeyman or supervisor on such things as the purpose the tooling device is to serve and any special features desired; and to determine the best proven gage, jig, or fixture design principles to be used to meet specific operational requirements.

Work is reviewed by the supervisor while in process and upon completion to see that it meets specifications arid accepted trade standards.

Physical Effort: The work in this occupation requires standing, stooping, bending, and reaching; moderate lifting up to 18 kilograms (40 pounds) when moving machine attachments and work pieces. Hoists, hand trucks, lifts, and other workers are available to assist with heavier items.

Working Conditions: The WG-11 Toolmaker normally works inside in a machine shop environment wherein there is danger to the skin and eyes from flying metal chips, abrasive particles, and hot metal; possibility of skin irritations from contact with coolants, lubricants, and abrasive compounds; danger to the fingers, hands, and other parts of the body from cutting tools, grinding wheels, rotating work pieces, and moving parts of machines. The worker is subjected to the usual dirt and noise of machine shop activities.

3416-13 Toolmaker, Grade 13 3416-13

General: The WG-13 Toolmaker fabricates, overhauls, calibrates, and repairs tools, jigs, fixtures, and gages used by workers performing machining and assembly work; develops, fabricates, and repairs various types of punches and dies for use in metal working press operations; and fabricates and repairs molds for use in molding and shaping plastics, rubber, and other materials. He may supply information to other trades relative to proper use of these items.

The work performed requires a high degree of skilled workmanship in the planning, layout, machining, assembly, and hand finishing of work to precise dimensions and close tolerances.

The WG-13 Toolmaker receives assignments through work orders or oral instructions normally accompanied by blueprints, sketches, or a model of the piece to be manufactured in the machine shop. He is often required to visit the job-site to study his assignment. He then independently plans the sequence of operations, obtains material, lays out work, calculates necessary dimensions and tolerances, and determines and plans for performance of related operations such as heat treating, plating, etc., assembles tool or fixture and checks functional performances making necessary changes. General instructions and suggestions are provided by the supervisor concerning unusual work or design changes.

Skill and Knowledge: The WG-13 Toolmaker applies a comprehensive knowledge of a wide variety of machine shop procedures and techniques and shop mathematics, as well as a high degree of skilled workmanship, in planning, laying out, machining, assembling, and hand fitting and finishing work to precise dimensions and close tolerances. He must have a knowledge of the physical properties of numerous metals, metal alloys, plastics, rubber, and other materials in order to determine their adaptability to the specifications required of the item to be made.

He must have an intimate knowledge of and the ability to read and interpret complex multiview mechanical drawings and sketches, or the ability to develop and prepare his own sketches from oral or written instructions, to enable him to calculate and work to precise dimensions and very close tolerances, make detailed and exact work layouts, and accomplish complex machine setups.

The WG-13 Toolmaker must have a working knowledge of and be able to use all precision measuring instruments common to the trade including vernier calipers, height gages, optical and electrical comparators, dial indicators, Johanssen and similar gage blocks, and various types of micrometers and supermicrometers. Similarly, he must use other types of measuring devices such as scales, dividers, surface gages, sine bars, protractors, steel squares, optical flats, and straight edges.

He must be able to adapt and set up common machine tools to perform-special and precise machining operations by devising and constructing his own fixtures and holding devices. The WG-13 Toolmaker must also be skilled in the setup and operation of specialized and precision machines such as jig borers, jig grinders, internal and external thread grinders, and various types

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of electrical discharge machines to manufacture, overhaul, and repair tools, dies, jigs, fixtures, molds and gages.

Using precision measuring instruments and various fixtures and holding devices which he must often contrive, the WG-13 Tool-maker must be able to check the accuracy of existing tools, jigs, fixtures, and gages; and fabricate, repair, modify and calibrate precision measuring instruments used in the machine shops such as vernier gages, various types of micrometers, plug and ring gages, snap gages, space blocks, and dial indicators.

The WG-13 Toolmaker must be familiar with the effect of hardening, annealing and stress relieving on metals and metal alloys in order to choose the proper materials for specific items to be made and make dimensional allowances for these processes.

He must have a thorough knowledge of grit-type, grit-size, and various bonds used in grinding wheels and, based on this knowledge, select a wheel of the proper grit, bond, and diameter, and compute the correct surface speed to be used in accordance with the material to be ground, edge or radius to be held, or other critical factors.

The WG-13 Toolmaker must have and maintain a knowledge of machine shop practices and processes, and keep abreast of technological changes as they occur and affect manufacturing procedures.

Responsibility: The Toolmaker, WG-13 receives assignments in the form of work orders or oral instructions usually accompanied by complex blueprints, sketches, drawings, or a model of the item which the tool will be used to manufacture. He must independently organize and determine his own work procedures and machining processes; note and provide for critical dimensions; and use arithmetic, geometric and trigonometric formulas to calculate angles, distances between centers, tapers, clearances, and establish necessary tolerances. When working from oral instructions or sketches, the WG-13 Toolmaker must often consult with the requester in order to properly devise, plan, and manufacture the tooling item requested, assuming responsibility for the proper design by determining the purpose the tooling device is to serve and the design features desired. He applies proven gage, jig, and fixture design principles, and determines the application which is the most effective for operational requirements.

The WG-13 Toolmaker may be assigned responsibility for checking and attesting to the dimensional accuracy of existing large and complex tools, jigs, fixtures, and gages and for making necessary corrections; and calibrating and repairing precision measuring tools to facilitate dependable accuracy on the part of workers in the machine shop.

He proceeds on work assignments from initial assignment to completion. General supervision is provided in the form of instructions and suggestions by the supervisor concerning unusual work

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or design changes. Completed projects are checked only to see that the work meets specifications and accepted trade standards.

Physical Effort: Physical effort at this grade is the same as that for the WG-11 level.

Working Conditions: Working conditions at this grade are substantially the same as those at the WG-11 level.